

**Amendments to the Claims**

This listing of claims will replace all prior version, and listings, of claims in the application:

**WHAT IS CLAIMED IS:**

1. (currently amended) A method of monitoring a power distribution system, said method comprising increasing a sampling rate for sampling analog monitoring signals from monitoring of said power distribution system until said sampling rate is high enough to capture high-speed transients wherein said increasing a sampling rate for sampling analog monitoring signals from monitoring of said power distribution system further comprises a first mode of sequentially sampling each of a plurality of lines of said power distribution system, and a second mode of controlling the sampling to discontinue sequential sampling of the plurality of lines and increase sampling of a particular line of the plurality of lines in said power distribution system to detect high speed transients, returning to sequential sampling of each of a plurality of lines when no high speed transients are detected.

2. (original) The method of claim 1, further comprising monitoring both current and voltage parameters within lines of said power distribution system to generate said analog monitoring signals.

3. (original) The method of claim 1, further comprising:  
storing sampled data from said monitoring signals in a memory unit; and  
analyzing said stored data with a processor.

4. (original) The method of claim 3, further comprising displaying sampled data, including detected high-speed transients, or data derived from said sampled data on a monitor.

5. (original) The method of claim 3, further comprising interrupting a flow of power on said power distribution system if analysis of said stored data indicates a danger according to pre-defined parameters.

6. (original) The method of claim 1, wherein said increasing said sampling rate further comprises increasing said sampling rate in response to user input from a user input device.

7. (original) The method of claim 1, wherein said increasing said sampling rate further comprises automatically increasing said sampling rate as part of a monitoring routine for said power distribution system.

8. (currently amended) A method of monitoring a power distribution system, said method comprising increasing a sampling rate for sampling analog monitoring signals from monitoring of said power distribution system until said sampling rate is high enough to capture high-speed transients ~~The method of claim 1, wherein said increasing a sampling rate for sampling analog monitoring signals from monitoring of said power distribution system further comprises taking every other sample from a particular line of said power distribution system.~~

9. (original) The method of claim 8, further comprising sampling said monitoring signals by multiplexing said monitoring signals to an analog-to-digital converter; wherein said increasing said sampling rate comprises controlling multiplexing of said monitoring signals to provide a single monitoring signal to said analog-to-digital converter for an extended time such that a sampling rate for that monitoring signal is increased high enough to capture high-speed transients in that monitoring signal.

10. (currently amended) ~~The method of claim 1, wherein said increasing said sampling rate further comprises controlling a sampling rate of one or more analog-to-digital converters, where each of said one or more analog-to-digital converters has a variable sample rate.~~ A method of monitoring a power distribution system comprising:

connecting each line in a power distribution system to a dedicated analog-to-digital converter in an array of analog-to-digital converters for providing monitoring signals indicative of current and voltage within the lines of the power distribution line;

controlling the sampling rate of each of the analog-to-digital converters in the array of analog-to-digital converters to at least periodically increase the sampling rate of at least one of the analog-to-digital converters to capture high-speed transients.

11. (currently amended) A system for monitoring a power distribution line, said system comprising:

connections for individual lines in said power distribution line for providing monitoring signals indicative of current and voltage within the lines of said power distribution line;

at least one analog-to-digital converter for sampling said monitoring signals, said converter sampling a monitoring signal fast enough to capture high-speed transients;

a processor for controlling a first mode of sequential sampling of each of the plurality of lines by the analog-to-digital converter of said power distribution system, and for controlling a second mode of discontinuing sequential sampling of the plurality of lines and increasing the sampling of a particular line of the plurality of lines to detect high speed transients, and controlling the sampling to return to sequential sampling of each of the plurality of lines when no high speed transients are detected.

12. (original) The system of claim 11, further comprising:

a multiplexer for multiplexing said monitoring signals to said analog-to-digital converter; and

a processor controlling said multiplexer, wherein said processor causes said multiplexer to provide a particular monitoring signal to said analog-to-digital converter long enough for said analog-to-digital converter to capture high-speed transients in said particular monitoring signal.

13. (original) The system of claim 12, further comprising a user input device connected to said processor, wherein said processor controls said multiplexer in accordance with user input from said user input device.

14. (currently amended) A system for monitoring a power distribution line, said system comprising:

~~said at least one a plurality of analog-to-digital converters comprises comprising~~  
an array of analog-to-digital converters, each receiving a particular monitoring signal;  
said analog-to-digital converters each having a variable sampling rate; and

~~said system further comprises a processor for controlling a~~ the sampling rate of  
said analog-to-digital converters to at least periodically increase ~~said~~ the sampling rate of  
at least one of the analog-to-digital converters in the array enough to capture high-speed  
transients.

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15. (original) The system of claim 14, further comprising a user input device connected to said processor, wherein said processor controls said array of analog-to-digital converters in accordance with user input from said user input device.

16. (original) The system of claim 11, further comprising an interrupt device for selectively halting power flow in said power distribution system if analysis of said stored data indicates a danger according to pre-defined parameters.

17. (original) A system for monitoring a power distribution system, said system comprising:

sampling means for sampling analog monitoring signals from monitoring of said power distribution system; and

means for selectively increasing a sampling rate of said sampling means until said sampling rate is high enough to capture high-speed transients;

wherein said means for selectively increasing a sampling rate of said sampling means further comprises a first mode of sequentially sampling each of a plurality of lines of said power distribution system, and a second mode of controlling the sampling to discontinue sequential sampling of the plurality of lines and increase sampling of a particular line of the plurality of lines in said power distribution system to detect high speed transients, returning to sequential sampling of each of a plurality of lines when no high speed transients are detected.

18. (original) The system of claim 17, further comprising:  
means for storing sampled data from said monitoring signals in a memory unit;  
and  
means for analyzing said stored data with a processor.

19. (original) The system of claim 17, further comprising means for interrupting a flow of power on said power distribution system if analysis of said stored data indicates a danger according to pre-defined parameters.

20. (original) The system of claim 17, further comprising user input means for controlling said means for increasing said sampling rate.

21. (original) The system of claim 17, wherein said sampling means further comprise means for multiplexing said monitoring signals to an analog-to-digital converter.

22. (original) The system of claim 21, wherein said means for multiplexing said monitoring signals are controlled by control means to provide a single monitoring signal to said analog-to-digital converter for an extended time such that a sampling rate for that monitoring signal is increased high enough to capture high-speed transients in that monitoring signal.

23. (original) The system of claim 17, wherein said means for increasing said sampling rate further comprises means for controlling a sampling rate of one or more

analog-to-digital converters receiving said monitoring signals, where each of said one or more analog-to-digital converters has a variable sample rate.

24. (new) The method of claim 8, further comprising:  
storing sampled data from said monitoring signals in a memory unit; and  
analyzing said stored data with a processor.
25. (new) The method of claim 8, further comprising displaying sampled data, including detected high-speed transients, or data derived from said sampled data on a monitor.
26. (new) The method of claim 8 further comprising interrupting a flow of power on said power distribution system if analysis of said stored data indicates a danger according to pre-defined parameters.
27. (new) The method of claim 8, wherein said increasing said sampling rate further comprises increasing said sampling rate in response to user input from a user input device.
28. (new) The method of claims 8, wherein said increasing said sampling rate further comprises automatically increasing said sampling rate as part of a monitoring routine for said power distribution system.
29. (new) The method of claim 10, further comprising controlling an interrupt device for selectively halting power flow in said power distribution system if analysis of said stored data indicates a danger according to pre-defined parameters.
30. (new) The method of claim 10, controlling a group of analog-to-digital converters in the array to periodically increase the sampling rate of the group of analog-to-digital converters enough to capture high-speed transients.

31. (new) The system of claim 14, further comprising an interrupt device for selectively halting power flow in said power distribution system if analysis of said stored data indicates a danger according to pre-defined parameters.

32. (new) The system of claim 14, wherein the processor at least periodically increases the sampling rate of a group of analog-to-digital converters in the array enough to capture high-speed transients.